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Chronic Hepatitis B and Hepatitis C Infection Surveillance Report 2010

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Chronic Hepatitis B
and
Hepatitis C Infection
Surveillance Report
2010

San Francisco, California

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Introduction

The Chronic Hepatitis B and Hepatitis C Infection Surveillance Report, 2010 presents data collected by the San Francisco Department of Public Health (SFDPH) Chronic Viral Hepatitis Registry Project from January 1, 2010 through December 31, 2010 on persons who are chronically infected with hepatitis B virus or have a past or present hepatitis C infection. SFDPH receives confidential disease reports containing basic demographic information from laboratories and providers, as mandated by state regulation. This basic information comprises core surveillance for chronic hepatitis B and past or present hepatitis C infection. In addition, past or present hepatitis C information was enhanced by contacting providers and interviewing persons who are chronically infected with hepatitis C virus. This report provides overviews of hepatitis B and hepatitis C infection, a description of the SFDPH Chronic Viral Hepatitis Registry, findings of chronic hepatitis B and past or present hepatitis C infection core surveillance and findings of chronic hepatitis C enhanced surveillance activities.

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This report summarizes information collected by the Chronic Viral Hepatitis Registry Project, Communicable Disease Control Unit (CDCU) in 2010. The report was written by Sue Shallow, MPH, Wendy Inouye, MS, MPA, and Amy Nishimura, MS, MPH and with major contributions from Melissa Sanchez, PhD, MA and Sandra Huang, MD. We thank the CDCU Chronic Hepatitis Team (Rachel Arrington, Alex Leung, Martina Li, Karen Luk) who collected data and maintained the registry, and David Stier, MD, the project Clinical Advisor. We are grateful to members of the project Advisory Panel (Natalie Bzowej, MD, PhD, Lisa Johnson, MD, Mandana Khalili, MD, Kevin Man, MD, Kimberly Page, PhD, MPH, Norah Terrault, MD, MPH, Albert Yu, MD, MPH, MBA, Hans Yu, DO). We thank the California Emerging Infections Program and the Division of Viral Hepatitis, Centers for Disease Control and Prevention for their financial and technical support of the San Francisco Chronic Viral Hepatitis Registry Project. Most of all, we thank the laboratorians, clinicians, and persons living with chronic hepatitis B and hepatitis C who provided the information that made this report possible.

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Overview of Hepatitis B Infection

Hepatitis B virus (HBV) causes a liver infection that can range in severity from a mild illness lasting a few weeks to a serious, lifelong illness. HBV may be transmitted when blood, semen, or other body fluids from an infected person enters the skin or mucous membranes of a person who is not immune to HBV through immunization or prior infection. Exposure can occur through sexual contact, needle sharing, accidental needle stick, sharing items that may be contaminated with blood such as razors or toothbrushes, unprotected contact with other body fluids (e.g., drainage from open skin wounds), or contact with HBV-contaminated surfaces. Thus, in addition to sexual contacts, household members who have prolonged, nonsexual close contact with persons with chronic hepatitis B may be at risk for exposure.[1] Hepatitis B virus can also be transmitted from an infected mother to her baby unless hepatitis B immunoglobulin and hepatitis B vaccine are given to the infant promptly at birth, followed by completion of a full hepatitis B vaccine series according to the schedule recommended by the Centers for Disease Control and Prevention (CDC) and the Advisory Committee on Immunization Practices.[2]

Acute HBV infection may be asymptomatic, particularly in children <5 years of age and immunosuppressed persons, or may cause an illness that typically begins three months after exposure (range, 60-150 days) and lasts for two to four months. Symptoms of acute infection include nausea, vomiting, loss of appetite, low-grade fever, abdominal pain, jaundice, dark-colored urine, and light-colored stools.[1,3] Approximately 95% of adults and children >5 years of age are able to eliminate the virus from the blood and are immune to reinfection. However, chronic HBV infection occurs more frequently in younger individuals: approximately 90% of infected infants and 25-50% of children infected at age 1 to 5 years will become chronically infected.[1] Persons who are immunosuppressed at the time of infection are also more likely to develop chronic hepatitis B.[3] HBV persists in the liver and may also be found in the bloodstream and in body fluids (such as feces, saliva, semen or urine) of chronically infected persons. Persons with chronic hepatitis B are at increased risk of developing severe liver complications such as cirrhosis, liver failure, and liver cancer. The CDC reports that from 2000-2003, HBV infection was the underlying cause of an estimated 2,000-4,000 deaths annually, mostly from cirrhosis and liver cancer.[1]

The incidence of acute hepatitis B has decreased in the United States from 11.5 cases per 100,000 population in 1985 to 1.6 in 2006, when an estimated 46,000 persons became newly infected with HBV. The greatest declines in acute hepatitis B have occurred in children and adolescents since 1990, when routine vaccination of children was implemented. However, the burden of chronic hepatitis B remains high: in 2008, the CDC estimated that 0.3-0.5% of U.S. residents, or 800,000-1.4 million persons, are chronically infected with HBV, 47-70% of whom were born in other countries.[3]

The prevalence of chronic HBV infection varies substantially by country. Highly endemic regions are defined by a prevalence of hepatitis B surface antigen (HBsAg) that is ≥8%; intermediate HBV endemicity is defined as a HBsAg prevalence of 2-7%; and low HBV endemicity is defined as a HBsAg prevalence of <2%. Eighty-eight percent of the world's population lives in countries of high or intermediate endemicity for HBV, including many countries in Asia, Africa, Eastern Europe, the Middle East, and the Pacific Islands, as well as some countries in Central and South America and the Caribbean. In September 2008, the CDC updated guidelines for identifying persons with chronic hepatitis B infection. Testing for HBsAg is now recommended for persons born in regions of intermediate or high endemicity for HBV, U.S.-born persons who were not vaccinated as infants and whose parents were born in regions with high HBV endemicity, injection drug users, men who have sex with men (MSM), persons with elevated liver enzymes alanine aminotransferase (ALT) or aspartate aminotransferase (AST) of unknown etiology, and persons with certain medical conditions that require immunosuppressive therapy. Testing for HBsAg continues to be recommended for pregnant women, infants born to mothers who test positive for HBsAg, household contacts and sexual partners of HBV infected persons, persons with HIV, and persons who may have been the source of body fluid or blood exposure.[3]

Overview of Hepatitis C Infection

Hepatitis C virus (HCV) is one of the most common bloodborne causes of chronic liver disease in the United States. HCV is transmitted primarily through contact with infected blood or blood products. Currently, injection drug use is the leading risk factor for HCV transmission in the United States and can be acquired from the use of shared, unsterilized needles, syringes or other injection equipment.[4] Receipt of donated blood, blood products and organs was once a common means of HCV transmission. However, due to the implementation of routine blood screening in mid-1992, and the introduction of virus inactivation procedures for clotting factor concentrates in 1987, the risk of HCV infection from these procedures in the United States is now rare. Other sources of exposure to HCV are from needlestick injuries in healthcare settings, mishandling and/or contamination of injection equipment (e.g., diabetes testing equipment, multi-dose vials) and from mother-to-child transmission, which occurs in approximately 4 of every 100 infants born to HCV-infected mothers. Other potential modes of transmission include sexual contact with an HCV-infected person or sharing personal items contaminated with infectious blood (e.g. razors, toothbrushes).[4]

Hepatitis C virus infection has an acute phase that can either resolve spontaneously or progress into a long-term chronic infection. Acute HCV infection is a short-term illness that occurs within the first six months after a person is exposed to the hepatitis C virus. Most people newly infected with HCV are asymptomatic. In those who do experience acute phase symptoms, symptoms typically occur 4-12 weeks after exposure, are usually mild and can include fever, fatigue, dark urine, light-colored stools, abdominal pain, loss of appetite, nausea, vomiting, joint pain and

jaundice.[4] In 2007, 849 cases of confirmed acute hepatitis C were reported in the United States, but due to the typically asymptomatic nature of acute HCV infection, this is certain to underestimate the true incidence. The CDC estimates that approximately 16,000 new HCV infections occurred in the United States in 2007.[5]

Acute HCV infection leads to chronic infection in approximately 75-85% of people infected with HCV. The remaining 15-25% of those newly infected are able to clear the virus without treatment and do not develop chronic infection. Most persons with chronic HCV infection are asymptomatic, and the infection is often not recognized until routine blood tests identify abnormal liver function.[4] The prevalence of chronic HCV infection in the general population of the United States has been conservatively estimated to be 1.3% or 3.2 million persons, most of whom were born between 1945 and 1964. The true prevalence may be even higher since incarcerated or homeless persons, populations known to have a high prevalence of HCV infection, may have been under-counted.[6]

Chronic HCV infection progresses very slowly, but complications of chronic infection may include cirrhosis, liver failure and liver cancer. Of those infected with HCV, 60-70% will develop chronic liver disease, 5-20% will develop cirrhosis over a period of 20-30 years and 1-5% will die from consequences of chronic infection (e.g. liver cancer or cirrhosis).[4] Chronic HCV infection is the leading indication for liver transplants and accounts for an estimated 12,000 deaths each year in the United States.[4]

The CDC recommends HCV testing for everyone at increased risk for HCV infection, including: all those who have ever injected drugs, even if it was only once in the remote past; recipients of clotting factor concentrates made in the United States before 1987; recipients of blood transfusions or solid organ transplants in the United States before 1992; patients who have ever received long-term hemodialysis; healthcare workers after needlestick injuries involving HCV-positive blood; all persons with HIV infection; children born to HCV-positive mothers; and patients with abnormal liver enzyme tests.[4]

Testing for HCV infection is often a multi-step process. A test for antibody to HCV virus (anti-HCV) by enzyme immunoassay (EIA) is recommended for initial screening. A positive anti-HCV test identifies persons who were exposed to HCV virus but is unable to distinguish a past infection from a present infection. Although the anti-HCV assay correctly identifies a true negative with 99% specificity, false-positive anti-HCV results occur frequently, especially among populations at low risk for HCV infection (e.g., blood donors, healthcare workers). Therefore, confirmation of positive anti-HCV tests is recommended, either with recombinant immunoblot assay (RIBA) to confirm the presence of anti-HCV antibody, or with a nucleic acid test (NAT) to detect the amount or presence of HCV RNA. Unfortunately, confirmatory testing of positive anti-HCV tests is not routinely performed. In response, the CDC developed criteria to improve the positive predictive value of anti-HCV testing: by restricting interpretation of

positive anti-HCV test results to only those results with the highest signal-to-cutoff (s/co) values, the positive predictive value of an anti-HCV test can be improved to 95%. This can serve as an alternative to confirmatory testing and provide a result with a high probability of reflecting the person's true HCV antibody status.[7]

There is currently no vaccine or effective postexposure prophylaxis (e.g. immune globulin) available for HCV.[4] HCV infection is also problematic in that prior infection does not protect against later infections with the same or different genotypes of the virus, and superinfection with more than one HCV genotype is possible.[8]

San Francisco Chronic Viral Hepatitis Registry

In 2005, the SFDPH received funding from the CDC to develop a population-based registry of persons in San Francisco with chronic hepatitis B and/or past or present HCV infection. SFDPH was able to build upon a pre-existing database that contained limited information from the first laboratory report of possible lab markers of chronic hepatitis B or past or present HCV infection reported on an individual between 1984 and 2004. Beginning in 2005, standardized protocols were implemented for data entry into a longitudinal, person-based information system that contains all positive hepatitis B and hepatitis C test results that are reported for San Francisco county residents and for persons whose residence is not known to be in another jurisdiction. The data that SFDPH receives from laboratories and clinicians represent core surveillance for chronic hepatitis B and past or present HCV infection and includes basic demographic information (name, sex, age, address) and hepatitis B or hepatitis C test results. Most of the data are reported by laboratories rather than clinicians. Laboratories have been mandated by the California Code of Regulations (CCR), Title 17, Section 2505[9] to report positive hepatitis B surface antigen results to public health since May 1995. However, laboratory reporting of HCV test results was not required until July 2007, and due to the complex state requirements for reporting anti-HCV antibody results, laboratories did not report these in a consistent manner until 2009.

Chronic hepatitis B cases are classified as probable or confirmed, according to the CDC/Council of State and Territorial Epidemiologist (CSTE) case definition. Cases of chronic hepatitis B are defined by laboratory tests that are reportable to public health; clinical information from health care providers or patients is not required to meet the case definition. In contrast, to classify cases of chronic hepatitis C, the patient and health care provider must be contacted to determine clinical symptoms, signs, and results of liver test results that are not routinely reported to local health authorities, in order to distinguish between acute, chronic, and resolved HCV infection. Because resources are not available to conduct such investigations on the thousands of HCV lab reports received each year, SFDPH cannot identify cases of chronic hepatitis C, but is able to identify persons who meet the CDC/CSTE laboratory criteria for past or present HCV infection. These limitations are further outlined in item 3 of the Data Limitations section of this report.

SFDPH also received CDC funding in 2010 to conduct enhanced surveillance on cases with past or present infection with hepatitis C. By directly contacting patients and faxing or mailing provider follow-up surveys to the providers, SFDPH can acquire information unavailable through routine public health reporting to better characterize the population of San Franciscans who are infected with hepatitis C, including detailed demographics, risk factors for infection and reason(s) the provider ordered hepatitis C testing on the case. Through these enhanced surveillance activities, SFDPH educates persons with past or present hepatitis C infection about their disease and preventing transmission of the infection to their close contacts.

Methods

Core Surveillance

Laboratorians, clinicians and other mandated reporters report positive results of tests for hepatitis B and hepatitis C to the SFDPH in compliance with Title 17, California Code of Regulations (CCR), Sections 2500 and 2505. In addition to reporting test results, laboratories and providers are required to report patient identifiers (e.g., name, date of birth, gender, address, phone number, medical record number) and provider identifiers (e.g., name, facility, address).[9] The SFDPH stores the reported information in a secure electronic database, organized by the person reported.

The 2007 CDC/CSTE laboratory criteria for diagnosis are applied to HBV test results to identify persons with probable and/or confirmed chronic hepatitis B. CDC defines a *probable* case of chronic hepatitis B as a person with a single positive hepatitis B surface antigen (HBsAg), positive HBV DNA, or positive hepatitis B e antigen (HBeAg) with no IgM antibody to hepatitis B core antigen (IgM anti-HBc) test reported. A *confirmed* case of chronic hepatitis B is a person who: a) has a single positive HBsAg, positive HBV DNA, or positive HBeAg test with a negative IgM anti-HBc or, b) tests positive for HBsAg, HBV DNA, or HBeAg two times at least six months apart.[10]

The 2010 CDC/CSTE laboratory criteria are applied to HCV test results to identify persons who meet laboratory criteria for past or present HCV infection. These persons may have acute, chronic, or resolved infection because no single lab test distinguishes acute from chronic HCV infection or chronic infection from resolved infection. Classification of HCV infections to this degree would require contacting clinicians or patients for further information on symptoms and/or additional testing (e.g. liver enzyme tests, negative HCV NATs). Due to the large volume of reports and limited resources for follow-up, SFDPH is unable to identify and enumerate cases of chronic hepatitis C.

The CDC laboratory criteria used to identify past or present HCV infection are any one of the following:

1. anti-HCV antibody positive (repeat reactive) by enzyme immunoassay (EIA), verified by an additional more specific assay (e.g. recombinant immunoblot assay (RIBA) for anti-HCV or nucleic acid testing for HCV RNA);
2. anti-HCV antibody positive by RIBA;
3. detection of HCV RNA;
4. HCV genotype;
5. anti-HCV antibody positive by EIA with a signal to cut-off (s/co) ratio predictive of a true positive (as determined by CDC).[7, 11]

In 2003, the CDC expanded recommendations for confirmatory testing to include the signal-to-cutoff (s/co) value of anti-HCV screening test positive results, as referenced in item 5, above. For each brand of assay, the CDC has calculated specific threshold s/co values that predict a true anti-HCV positive result ≥95% of the time.[7] California regulations require laboratories to report anti-HCV antibody results in a manner that indicates whether or not the s/co value meets CDC criteria.[9]

For this report, age is defined as the age of the person at the time that the first positive hepatitis B or hepatitis C report is received by the SFDPH. Age is calculated by subtracting the date of birth from the date of first notification of the case to SFDPH, then dividing the difference by 365.25 (the .25 accounts for leap years). The number and percent of persons for whom age is unknown is shown in a table footnote.

Race is classified as American Indian/Alaska Native, Asian/Pacific Islander (A/PI), African American (Black), White or Other. The number and percent of persons for whom race is unknown is shown in a table footnote. Hispanic ethnicity was rarely reported and thus is not included in the data tables.

Enhanced Surveillance for Past or Present Hepatitis C Infection

Beginning in 2010, a subset of San Francisco past or present hepatitis C cases were interviewed by telephone as part of enhanced surveillance activities. Fourteen percent of cases with confirmed past or present hepatitis C infection were randomly selected from hepatitis C cases newly reported to the SFDPH Chronic Viral Hepatitis Registry from January 1, 2010 through December 31, 2010.

Following selection for enhanced follow-up, a one-page data collection form was sent to the health care provider who ordered the most recent positive HCV test to request patient locating information, race/ethnicity, primary language, reason the provider ordered the test, and risk factors. The provider was also informed that SFDPH would be contacting the patient. Approximately one month after contacting the provider, the case was contacted by telephone and a public health interview was conducted. Cases were ineligible for enhanced surveillance interview follow-up if they were found to be a resident of another county, if their clinician asked

SFDPH not to contact them, if they were found to have an acute case of hepatitis C, if the lab test was discovered to be a false positive, or if they were deceased.

Using a structured telephone interview, eligible persons were asked about demographic information, including race/ethnicity, country of birth and primary language, as well as questions about selected health services received for hepatitis C, disease status and risk factors for acquisition of HCV. Education about HCV transmission and preventing infection of close contacts was offered by phone and contacted cases were also sent educational materials and community resources for testing and vaccination in the desired language(s). Cases who stated that they were unaware of their HCV diagnosis were given a shortened interview which focused on collecting demographic, hepatitis C risk factor and selected health characteristic information, and the clinician was notified about the case's unaware status.

Data collected and summarized in this report is kept strictly confidential. SFDPH is authorized by law to collect information on cases of chronic hepatitis B and past or present HCV infection for the purpose of controlling or preventing disease including: the reporting of disease, the conduct of public health surveillance, public health investigation and public health intervention.[12] SFDPH employees have a legal and ethical responsibility to protect the confidentiality of protected health information, and to use that information only in the performance of their jobs.

Data Limitations

1. Surveillance data do not measure prevalence: The data presented are not an estimate of the prevalence of chronic HBV or HCV infection in San Francisco residents. Prevalence cannot be calculated because some persons infected with HBV or HCV are not tested, and others were tested before consistent reporting to SFDPH was established. In addition, some persons who were tested anonymously may not have been reported to SFDPH. Finally, people who were included in these data may not live in San Francisco, either because their address information was not provided or because they have moved.

2. Surveillance data do not measure incidence: The data presented are not an estimate of the incidence rate of chronic hepatitis B or past or present HCV infected cases in 2010. The incidence rate is the number of newly infected persons occurring within a defined time in a defined geographical area. While SFDPH does identify the first date the case was reported to them, this date is not necessarily the date the case became infected or was newly diagnosed. For example, some cases may have been infected many years ago but had no symptoms and were not tested when newly infected, but were tested in 2010 because a clinician was following recommended screening practices or because symptoms of chronic hepatitis have developed.

3. HCV Infection: The HCV infection data presented potentially overestimate the number of reported persons who have chronic HCV infection. Acute HCV infections may be included

because no single laboratory test distinguishes acute from chronic HCV infection, and acute infection is based on clinical symptoms and liver function tests that are not reported to the health department. Resolved HCV infections may also be included, because no single laboratory test distinguishes chronic from resolved HCV infection; resolved HCV infection requires a clinician assessment and a pattern of negative tests (e.g., HCV NATs) that are not required to be reported to public health. Distinguishing between acute, chronic, and resolved infections would require public health follow up with clinicians and/or patients to collect symptom and additional laboratory test results. Due to the large volume of reports and limited resources for follow-up, SFDPH was limited to conducting HCV surveillance based on HCV test results that are required to be reported to public health and could only define persons as having past or present infection.

4. Reporting gaps: Complete identification of chronic hepatitis B and past or present HCV infected cases depends on complete reporting by laboratories and clinicians. All reports of positive hepatitis B and hepatitis C test results received by SFDPH in 2010 came from laboratories, which are mandated to report positive hepatitis B and hepatitis C test results under Title 17, California Code of Regulations (CCR).[9] Under-reporting by laboratories is believed to be minimal as the majority have automated processes for fulfilling their legally mandated obligations to report to SFDPH. Although Title 17, CCR also mandates reporting of chronic hepatitis B and past or present HCV infection by clinicians, SFDPH has not received reports of chronic hepatitis B or past or present HCV infection from clinicians during this period. There are likely San Francisco residents with chronic hepatitis B and/or past or present HCV infection who did not receive laboratory testing for hepatitis B or hepatitis C during this period, and whose treating clinician did not report their condition. Information about these persons is therefore missing from this report. Finally, the data presented may include persons who have left San Francisco or who have died after they were reported to the SFDPH.

5. Missing information: Laboratory information systems frequently do not receive or store information about patient race and ethnicity, resulting in a large proportion of cases reported with unknown race and ethnicity. Since 2006, SFDPH has been able to supplement race information by collaborating with two large laboratories to establish a link between their laboratory information systems and the demographic data from the clinical records and report that information electronically. Through enhanced surveillance on a subset of cases, SFDPH was also able to obtain race information by self-report.

Similarly, some laboratory reports are missing the patient's address. For approximately 10.5% of persons who were reported to SFDPH in this period (12.2% of chronic hepatitis B cases and 8.5% of past or present HCV infected cases), their residence was unknown. Information about cases whose county of residence was unknown was included in this report, along with cases that are known to live in San Francisco. Thus, the core surveillance data presented may overestimate the number of San Franciscans who were reported with chronic hepatitis B or past or present HCV infection during this period.

6. Duplication: SFDPH follows procedures to minimize duplicate records for persons whose laboratory results may be submitted with slight variations in name spelling (e.g., use of middle initial, typographic error). However, in some instances it may not be obvious that two different names belong to the same person, so two cases will be recorded instead of one. This would lead to a slight overestimate of the number of persons who were reported with chronic hepatitis B or past or present HCV infection in this period. Conversely, in some situations, information from a case may have been erroneously matched and joined to the information from another case, leading to potential underestimation of the number of chronic hepatitis B and past or present HCV infected cases reported in this period. The magnitude of potential error caused by incorrect deduplication of similar records is estimated to be between -2% and + 2%.[13]

7. Limitations of enhanced surveillance interviews: A 14.4% random sample of reported past or present hepatitis C cases were selected for enhanced surveillance, including provider survey and case interview, in order to obtain information that would be representative of diagnosed, reported persons with past or present hepatitis C infection in San Francisco. Enhanced surveillance could not be completed for all eligible cases. Thus, the data presented in this report may have been affected by selection bias if the cases who were not interviewed differed substantially from interviewed cases.

Epidemiology of Chronic Hepatitis B in San Francisco

Core Surveillance Data

From January 1, 2010 through December 31, 2010, SFDPH received over 5,000 positive hepatitis B laboratory reports on 3,630 individuals. Of the 3,630 individuals, 1,172 (32.3%) were newly reported to SFDPH. Of the 3,630 cases reported in 2010, 1,151 (31.7%) met the CDC laboratory criteria for a probable case of chronic hepatitis B and 2,479 (68.3%) met the CDC laboratory criteria for a confirmed case of chronic hepatitis B.

Data presented in Tables 1.1 and 1.2 below are for all probable and confirmed cases of chronic hepatitis B with at least one test reported to SFDPH in 2010 (n=3,630). These data do not represent the number of incident or prevalent infections (see limitations section). More cases were male (52.4%) (Table 1.1) and between the ages of 25-54 years (69.3%) (Table 1.2) when first reported to SFDPH. Of the 62.5% of cases for whom race was known, 87.9% of cases were Asian/Pacific Islander (API) (Table 1.3).

Table 1.1. Sex of reported chronic hepatitis B cases, 2010*

Sex	N	%
Male	1,894	52.4%
Female	1,720	47.6%
Total	3,614	100%

*Sex data missing for 16/3,630 (0.4%) of all cases

Table 1.2. Age group of reported chronic hepatitis B cases, 2010*

Age group, years	N	%
<15	44	1.2%
15-24	278	7.7%
25-34	860	23.7%
35-44	871	24.0%
45-54	783	21.6%
55-64	554	15.3%
65+	236	6.5%
Total	3,626	100%

*Age data missing for 4/3,630 cases (0.1%) of all cases

*Table 1.3. Race of reported chronic hepatitis B cases, 2010**

Race	N	%
Asian/Pacific Islander	2,000	87.9%
White	140	6.2%
African American	86	3.8%
American Indian/Alaska Native	10	0.4%
Other	39	1.7%
Total	2,275	100%

*Race data missing for 1,355/3,630 (37.3%) of all cases

Epidemiology of Past or Present Hepatitis C Infection in San Francisco

Core Surveillance Data

From January 1, 2010 through December 31, 2010, SFDPH received over 4,900 positive hepatitis C laboratory reports on 3,101 individuals with confirmed past or present hepatitis C infection. Of these 3,101 individuals, 1,677 (54.1%) were newly reported to SFDPH in 2010.

Data presented in Tables 2.1, 2.2 and 2.3 below are for all persons who met laboratory criteria for confirmed past or present HCV infection with at least one test reported to SFDPH in 2010 (n=3,101). These data do not represent the number of incident or prevalent infections (see limitations section). More infections were reported in males (68.6%) (Table 2.1) and in persons between the ages of 45-64 years (66.2%) when first reported to SFDPH (Table 2.2). Of the 63.9% of persons for whom race was known, 53.7% were White and 32.9% were African American (Table 2.3).

*Table 2.1. Sex of reported persons with past or present HCV infection, 2010**

Sex	n	%
Male	2,106	68.6%
Female	963	31.4%
Total	3,069	100%

*Sex data missing for 32/3,101 (1.0%) of all persons

*Table 2.2. Age group of reported persons with past or present HCV infection, 2010**

Age group, years	n	%
<15	3	0.1%
15-24	43	1.4%
25-34	200	6.5%
35-44	509	16.4%
45-54	1,116	36.0%
55-64	936	30.2%
65+	293	9.5%
Total	3,100	100%

*Age data missing for 1/3,101 (0.03%) of all persons

*Table 2.3. Race of reported persons with past or present HCV infection, 2010**

Race	n	%
White	1,064	53.7%
African American	653	32.9%
Asian/Pacific Islander	190	9.6%
American Indian/Alaska Native	21	1.1%
Other	54	2.7%
Total	1982	100%

*Race data missing for 1,119/3,101 (36.1%) of all persons

Enhanced Surveillance Data

For public health enhanced surveillance purposes, a random 14.4% sample was selected from the 1,677 persons for whom SFDPH received the first positive laboratory test confirming past or present HCV infection in 2010 (see Methods section).

Data Collected from Providers

Of the 241 cases that were randomly selected for enhanced surveillance, 237 cases were eligible for provider enhanced surveillance (see Methods section for exclusion criteria). Of the 237 provider enhanced surveillance forms sent to providers, 184 (77.6%) were returned. Providers reported that 14 (7.6%) of the 184 cases lived in another jurisdiction and these cases were therefore not considered to be cases under surveillance by SFDPH. The data received on these 14 cases are not included.

Of the cases for whom a provider enhanced surveillance form was returned, providers reported that 51.2% of the cases were immune to hepatitis A and 48.2% were immune to hepatitis B. Providers reported that 16.5% of the cases were not immune to HAV and that they did not know their patient's HAV immune status for 32.3% of the cases. Providers reported that 30.5%

of the cases were not immune to HBV and that they did not know their patient's HBV immune status for 21.3% of the cases (Table 3.1).

Table 3.1. Selected health status information reported by provider for persons newly reported with past or present HCV infection, 2010

Characteristic (n responding)	Yes		No		Unknown	
	n	%	n	%	n	%
Immune to HAV (n=164)	84	51.2%	27	16.5%	53	32.3%
Immune to HBV (n=164)	79	48.2%	50	30.5%	35	21.3%

Table 3.2 shows reasons the provider ordered HCV testing on the case. The reasons for testing are not mutually exclusive; providers may report testing the case for more than one reason. Common reasons that cases with newly reported past or present HCV infection were tested for HCV included having elevated liver enzymes (44.3%) and being asymptomatic but with reported risk factors for infection (42.6%). Of the 25.4% of cases who were tested for HCV infection to either evaluate the cases for treatment or to monitor treatment, the majority (27/35, 77.1%) had been tested for HCV RNA or HCV genotype.

Table 3.2. Reasons for testing reported by provider for persons newly reported with past or present HCV infection, 2010*

Characteristic (n responding)	Yes		No		Unknown	
	n	%	n	%	n	%
Evaluation of elevated liver enzymes (n=140)	62	44.3%	67	47.9%	11	7.9%
Screening asymptomatic person with reported risk factors (n=141)	60	42.6%	65	46.1%	16	11.3%
Evaluation for treatment or treatment monitoring (n=138)	35	25.4%	89	64.5%	14	10.1%

*Categories are not mutually exclusive.

Data Collected from Case Interviews

Of the 241 cases that were randomly selected for enhanced surveillance, 223 cases were eligible for enhanced public health surveillance by telephone interview (see Methods section for exclusion criteria). Eighteen (7.5%) of the 241 sampled cases were ineligible for interview because they resided in another county. Of the 223 eligible cases, 90 (40.4%) were interviewed. Of the 133 eligible cases who were not interviewed, 54.1% were unable to be contacted, 26.3% had missing or invalid contact information, 15.0% refused to be interviewed, 1.5% were not contacted per the provider's request, 0.8% were deceased, 1.5% were in jail and unable to be interviewed, and 0.8% had no phone. Of the 90 interviews, 3 (3.3%) were completed by proxy

for the cases and 2 cases (2.2%) refused to complete the interviews. Of the 90 interviewed cases, nine (10.0%) stated that they were unaware of their past or present hepatitis C infection.

Table 3.3 below presents demographic data for all cases that completed an interview. Over 64% of interviewed cases were male and 67.7% were 45-64 years of age. Over 52% of cases were white and 23.3% were African-American. These proportions are similar to the overall demographic characteristics of the 3,101 cases reported during 2010. However, cases who were interviewed were less likely to be African American (23.3% vs. 32.9%) and more likely to be Asian (17.8% vs. 9.6%) compared to all cases reported in 2010.

Table 3.3. Demographic characteristics of interviewed persons with past or present HCV infection, 2010

Characteristic	n	%
Sex		
Male	58	64.4%
Female	32	35.6%
Total	90	100%
Age group, years		
<15	0	0.0%
15-24	0	0.0%
25-34	4	4.4%
35-44	15	16.7%
45-54	31	34.4%
55-64	30	33.3%
65+	10	11.1%
Total	90	100%
Race		
White	47	52.2%
African American	21	23.3%
Asian/Pacific Islander	16	17.8%
American Indian/Alaska Native	0	0.0%
Other	3	3.3%
Missing/Unknown	3	3.3%
Total	90	100%

Table 3.4 shows lifetime risk factors reported by interviewees. Reported risk factors are not mutually exclusive; respondents could report more than one risk factor. Additionally, the presence of a risk factor does not necessarily indicate the source of HCV infection. Almost 56% of respondents reported ever injecting drugs. Of the 90 interviewees, 33 (36.7%) reported having contact with a person infected with hepatitis C. Type of contact reported by the cases

was not mutually exclusive; cases could report more than one type of contact. Of the 33 persons reporting contact with an HCV infected person, 51.5% had sexual contact, 24.2% had household contact and 51.5% had contact other than sexual or household (e.g., family member, friend). More than 20% of male respondents reported that they were men who have sex with men (MSM). Of the 12 cases reporting MSM, 5 (41.7%) reported not injecting drugs. Given that incarceration may serve as a proxy for risk-taking behavior associated with HCV infection, cases were also asked if they had ever been incarcerated. Of the 90 respondents, 37 (41.1%) reported having a history of incarceration.

Table 3.4. Lifetime risk factors of interviewed persons with past or present hepatitis C infection, 2010

Characteristic (n responding)	Yes		No		Unknown	
	n	%	n	%	n	%
Injection drug use (n=90)	50	55.6%	40	44.4%	0	0.0%
Contact with HCV infected person (n=90)	33	36.7%	27	30.0%	30	33.3%
Transfusion before 1992 (n=90)	22	24.4%	64	71.1%	4	4.4%
Male sex with males* (n=59)	12	20.3%	47	79.7%	0	0.0%

*Asked only of males.

Table 3.5 shows knowledge of hepatitis C infection and disclosure of hepatitis C infection to close contacts, as reported by interviewees. Almost 36% of interviewees reported not knowing how they might have become infected with hepatitis C. Almost 78% of interviewees told their sex or household partner that they were infected with HCV. Ten percent of interviewees were unaware that they were infected with hepatitis C.

Table 3.5. Knowledge and disclosure of hepatitis C infection status, 2010

Characteristic (n responding)	Yes		No		Unknown	
	n	%	n	%	n	%
Knowledge about how they might have become HCV-infected (n=90)	55	61.1%	32	35.6%	3	3.3%
Told sex partner or household contact of HCV infection (n=80)	62	77.5%	15	18.8%	3	3.8%
Unaware of HCV infection (n=90)	9	10.0%	81	90.0%	0	0.0%

*Asked only of males.

Discussion

Based on an evaluation of the National Health and Nutrition Examination Survey (NHANES), the estimated prevalence of chronic hepatitis B among persons aged 6 years or older in the U.S.

is currently 0.27% (reported from 1999 to 2008).[14] Across differing racial or ethnic groups, the prevalence estimate widely varies, however. For persons of racial or ethnic groups other than White, African American, or Hispanic in the U.S., the prevalence estimate is over seven times higher than the national estimate (1.97%), with the assumption that most of these persons are of Asian race or ethnicity.[14] Unfortunately, the NHANES sampling methodology does not include oversampling or specific identification of Asian races or ethnicities that have a high prevalence of HBV.

Evaluation of San Francisco's chronic HBV core surveillance data showed that the vast majority of cases reported in 2010 were APIs. APIs were disproportionately affected by HBV, comprising 87.8% of the HBV-infected cases reported in 2010 among cases where race was known but only 33.7% of the overall San Francisco population.[15] The fact that APIs bear the largest burden of chronic HBV infection in San Francisco continues to highlight the need to provide culturally and linguistically appropriate public and patient education about HBV prevention throughout the API community. Efforts to raise awareness about HBV prevention and treatment in the API and clinical communities have been undertaken by SF Hep B Free, a citywide campaign that began in 2007 to promote HBV testing and vaccination of all API persons in San Francisco.

Overall, characteristics of cases with chronic HBV who were reported in 2010 remained similar to those observed in previous years. Slightly over half (52.4%) of cases were male and 55.4% of reported cases were 15-44 years of age, an age group in which both males and females may be more likely to transmit HBV through sexual activity and in which women may transmit HBV perinatally.

Estimates from the most recent National Health and Nutrition Examination Survey (NHANES) showed that most of the 3.2 million Americans chronically infected with HCV were male and most were born between 1945 and 1964.[6] San Francisco core surveillance data for persons reported in 2010 with past or present HCV infection were similar to the NHANES findings; over two-thirds were male and two-thirds of cases were born between 1945 and 1964. The majority of cases were first reported to SFDPH when they were over the age of 40, an age when complications from chronic HCV infection may start to develop.[16] African Americans were disproportionately affected; comprising 32.9% of the HCV-infected cases reported in 2010 but only 6.1% of the overall San Francisco population.[15] Comparable to NHANES estimates, the most frequently reported risk factor reported by cases with past or present HCV infection was injection drug use. In addition, similar to NHANES estimates, transfusion prior to 1992 was another significant risk factor for past or present HCV infection.[6]

Providers reported approximately 50% of patients were not immune or had unknown immunity to HBV or HAV suggesting an important gap in provider's knowledge of recommended healthcare policies for management and treatment of hepatitis C. The American Association for

the Study of Liver Diseases (AASLD) established guidelines in 2009 recommending that HCV-infected persons be tested for immunity to HAV and to HBV and be immunized if susceptible.[16]

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